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INTEGRATIVE REVIEW OF THE LITERATURE

A produção de software por enfermeiros para utilização na assistência ao paciente

Software production by nurses for use in patient care

La producción de software por enfermeros para utilización en la atención al paciente

Lucilia Feliciano Marques di Carlantônio ¹, Luiz Célio Martins Freitas ², Débora Matos de AzevedoFontes ³, Cristiana Fialho Braz Silva ⁴, Luiz Carlos Santiago ⁵

ABSTRACT

Objective: analyzing the scientific literature referring to strategies used for the production of software for the application by nurses in patient care through a literature review published between 1985 and 2013 and summarizing the findings. **Method:** an integrated review article search occurred online in English, Portuguese and Spanish, in databases LILACS, BDNF, MEDLINE, IBECs, Web of Science and SCOPUS, where the descriptors were applied individually and subsequently crossed, finally applied the filters language and period, limiting the search. **Results:** it was found that most software produced by nurses was directed to the educational area. There were found only seventeen studies on the topic in question, of which 52% had high impact strength. **Conclusion:** in this age of technology, this production may still be considered too little. **Descriptors:** Software, Nursing informatics, Medical informatics, Technology.

RESUMO

Objetivo: analisar a produção científica referente às estratégias utilizadas para produção de software por enfermeiros para a aplicação na assistência ao paciente através de uma revisão da literatura publicada entre 1985 e 2013, e sintetizar os achados. **Método:** revisão integrativa, busca de artigos ocorreu de forma online, em língua inglesa, portuguesa e espanhola, nas bases de dados LILACS, BDNF, MEDLINE, IBECs, WEB OF SCIENCE e SCOPUS, onde os descritores foram aplicados individualmente e posteriormente cruzados, por fim aplicados os filtros de idioma e período, delimitando a busca. **Resultados:** constatou-se que a maioria dos softwares produzidos por enfermeiros foi direcionada à área educacional. Foram encontrados apenas dezessete estudos sobre o tema em questão, dos quais 52% apresentaram força de impacto elevada. **Conclusão:** nesta era de tecnologia, esta produção ainda pode ser considerada muito pequena. **Descritores:** Software, Informática em enfermagem, Informática em saúde, Tecnologia.

RESUMEN

Objetivo: analizar la literatura científica referidas a las estrategias utilizadas para la producción de software para la aplicación de las enfermeras en la atención al paciente a través de una revisión de la literatura publicada entre 1985 y 2013, y un resumen de los hallazgos. **Método:** una búsqueda en artículo de revisión integrado ocurrió formulario en línea en Inglés, portugués y español en las bases de datos LILACS, BDNF, MEDLINE, IBECs, Web of Science y Scopus, donde se aplicaron individualmente los descriptors y posteriormente cruzaron finalmente aplica los filtros periodo y lengua, limitando la búsqueda. **Resultados:** se encontró que la mayor parte del software producido por las enfermeras se dirige a la zona educativa. Sólo se encontraron diecisiete estudios sobre el tema en cuestión, de los cuales 52% tenían alta fuerza de impacto. **Conclusión:** en esta era de la tecnología esta producción aún puede ser considerada demasiado pequeña. **Descriptor:** Programas informáticos, Informática aplicada a la enfermería, Informática médica, Tecnología.

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INTRODUCTION

The introduction of information technology in the health field and its unquestionable permanence drive many technological advances. Thus, professionals of this field are in constant development and learning regarding the concepts and information management methods and their applicability to the provision of patient care.

The New Information and Communication Technologies (NTIC) are associated with the rupture of an old model of communication and transition information, and the emergence of a new era evidenced by interactivity, regardless of professional area. The computer launches devices as the hardware and software, for example, to better promote the communication channel to be established by users. Therefore, it is urgent for its understanding in the context of knowledge and professional nursing practices, that is, its use by nurses in direct and indirect interventions according to the needs presented by patients under hospital treatment, becoming condition mandatory for any professional to deal with the computerized language, aiming to improve the quality of their actions.¹

In this context, health professionals, institutions and society themselves should recognize the importance of computer use in health care, its potential benefits, facilitating access to information, facilitating the language of communication and improving the quality of health care. The use of software in health care functions as an intelligent support system that assists in making clinical decisions, favoring better organization, information management and serving as a basis to care.²

In order to keeping all this technological development and optimize the monitoring and control of its daily activities, nursing is in the context of NICTs, and today the number of institutions that use this device in practice is increasing.

At the national and international scene, the practice of computer science in nursing has been developing increasingly, through the development and assessment of applications, tools, processes and structures that assist nurses in the management of data, in providing care and support as practice nursing.

The computerized systems are changing rapidly and nursing can and should be involved in the process models for improvement, planning, visual programming and validation of new software that meets their expectations and improve the performance of their practice, enabling the exchange of information in record speed and the possibility of longer dedication to staying with the patient.³

In this sense, it has become relevant and researches are being developed as the experiences of nurses in the production of software as a technological resource to be used in nursing care to patients. Given this research question, this study aimed to lift the state of

the art for the production of software for the application by nurses in the care process to the patient, analyzing qualitative and quantitative findings published in the literature.

METHOD

The study is characterized as an integrative review. Integrative review is the broadest type of review research because it allows the simultaneous inclusion of experimental research and non-experimental, combines empirical and theoretical literature data and incorporates a wide range of purposes: to define concepts, theories review, review evidence and the examine methodological issues a specific theme.⁴

The development of an integrative review occurs in six distinct stages: issue identification and research questions, sampling or literature search, categorization study, evaluation of the studies included in the literature review, interpretation of results and synthesis of knowledge evidenced in the analyzed articles or presentation of integrative review.⁵⁻⁶

The search for articles occurred online and also in English, Portuguese and Spanish. The scan was performed in databases: LILACS (Latin American and Caribbean Health Science), BDENF (Base of Nursing data), MEDLINE (Medical Literature analysis and Retrieval System Online), IBECS (Spanish Bibliographic Index of Sciences of Health), WEB OF SCIENCE (Portal of journals that gives access to several databases that refer to interdisciplinary research, which allows in-depth exploration of specialized sub-fields within an academic or scientific discipline) and SCOPUS (bank data summaries and citations of articles for newspapers/magazines academics). The descriptors used were "software" AND "nursing informatics", "health informatics/medical informatics" AND "technology".

The inclusion criteria of the articles in the integrative review were: that discussed about information technology application in nursing care; written by nurses between the period 1985 to 2013, texts that were available online in English, Portuguese and Spanish. Exclusion criteria were: restricted access; study references that did not treat the proposed theme; references repeated studies appeared in the databases; and different languages of the proposed.

In September 2013, the search was initiated by the aforementioned database, first used the descriptors individually and later with the passing thereof. Finally, the filters were inserted: period: 1985-2013 and language: English, Portuguese and Spanish.

Regarding the duplicity of studies, found in more than one database used in the research, the need to delete the copies was found, leaving only one version to be analyzed.

For data extraction of the selected studies, we used a data collection instrument contemplating the items: authors, article titles, journal, and country of origin of the study,

year of publication, classification Qualis CAPES, research source, design and objectives of the research.

After selected, the studies were classified according to their impact factor and publication quality, based on the journals where they were published, using the classification established by the Higher Education Personnel Training Coordination (CAPES), called Qualis, which brings together a set of procedures for stratification of the value of intellectual production of graduate programs. Thus, Qualis assesses the quality of articles and other types of production, from the analysis of the quality of scientific journals. Thus, the journals are classified in strata indicative of quality - A1, the highest; A2; B1; B2; B3; B4; B5; C - with zero weight.⁷

The analysis of articles taken from those included in this review undertaken in a descriptive manner allowing the evaluation of the evidence, future research need to identify about the theme and trying to offer grounds for professional practice.

RESULTS AND DISCUSSION

There were found 214 references in the databases searched, summarized in Table 1.

Databases searched	Use of NTICs in nursing	Production of educational software	Free software adaptation for use in assistance	Production of software for assistance
LILACS	18	9	2	6
BDENF	36	5	4	7
IBECS	6	2	2	2
MEDLINE	80	13	7	2
SCOPUS	42	8	4	9
WEB OF SCIENCE	32	8	3	5
Total	214	45	22	31

TABLE 1 - Number of references of studies found in the databases searched, according to the thematic.

Of this total, 116 references dealt with the use of NICTs in the context of nursing, while 98 references specifically about the production and use of software by nurses: 45 references studies focused on the creation of software for nurses to educational application; 22 references studies where nurses used free software, adapting them for application in practice; 31 references to studies on the production of software for nurses and intended for application in practice.

Of the 214 studies found, after the exclusion process, only 17 fulfilled the pre-established inclusion criteria.

these 17 studies, 16 were published in journals and only 01 this is a doctoral thesis on the subject, published in the virtual library. The list of studies and their citations in the databases are shown in Table 2 below.

Studies relating to the production of software for nurses to use in assistance	Database						
	1	2	3	4	5	6	7
Veríssimo RCSS, Marin HF. Prototype system of nursing documentation in the puerperium. ACTA Paul. Nursing. 2013; 26(2):108-115.	●		●				
Olinghouse C. Development of a computerized intravenous insulin application (AutoCal) at Kaiser Permanent Northwest, integrated into Kaiser Permanent Health Connect: impact on safety and nursing workload. Perm J. 2012; 16(3):67-70.				●			
Baptista PCP, Felli VEA, Mininel VA, et al. Using technological innovation as a tool for monitoring the health of nursing workers. Rev. Esc. Nursing. USP. 2011; 45(E):1621-1626.	●	●					
Olson BD, Fauchald SK. A Transdisciplinary Approach to Developing a Web-Based Nursing Experiential Log System for Advanced Practice Nursing Clinical Experiences. CIN-Computer. Inf. Nurs. 2011; 29(11):630-636.		●					
Santos SR. Nursing Informatics: free software development with assistance and management application. Rev. Esc. Nursing. USP. 2010; 44(2):295-301.	●	●		●	●	●	
Castro MCN, Dell'Acqua MCQ, Corrente JE, Zornoff DCM, et al. Computerized application to the nursing activities score: Instrument management for assistance in intensive care unit. Text & Context Nursing. 2009; 18(3):577-585.		●					
Ríos JFG, Murillo R, Hernández JA. Analysis and design of a nursing information system. (Part I: theoretical approximation). Puesta día urgenc. emerg. Catastr. 2008; 8(3):150-155.							●
Caetano KC, Peres HHC, Fugulin FMT. Prototype of an expert system for classification of complexity in nursing assistance. Online braz. j. nurs. 2007;6(1), abr.	●					●	
Sperandio DJ, Évora YDM. Planning of nursing care: proposal of a software prototype. Rev. Latinoam. Enferm. 2005;13(6):937-943.	●				●	●	
Lopes MVO, Silva VM, Araújo TL. Logical-mathematical software development ND. Rev. latinoam. Enferm. 2004;12(1):92-100.					●		
Berry DL, Trigg LJ, Lober WB, et al. Computerized symptom and quality-of-life assessment for patients with cancer part I: development and pilot testing. Oncol. Nurs. Forum. 2004;31(E 5):75-83.	●						
Sperandio DJ, Évora YDM. Systematization of nursing care: proposal of a software-prototype. Esc. Anna Nery Rev. Enferm. 2003; 7(2):269-282.					●	●	
Sperandio DJ, Évora YDM. Nursing in the digital age: development of a prototype software for systematization of nursing care. Ciênc. cuid. Saúde. 2003;2(1):31-36.					●	●	
Guimarães SM, Gus J, Prestes AMP, Zimmer PM. Drawing up software for refill of nursing in post-anesthetic recovery room of the Hospital of Clinics of Porto Alegre. Approach (São Paulo). 1990; 18(1):11-16.						●	
Roth K, DiStefano 3rd. JJ, Chang BL. CANDI. Development of the automated nursing assessment tool. CIN-Comp. inf. nurs. 1989;7(5):222-227.	●						
Bloom KC, Leitner JE, Solano JL. Development of an expert system prototype to generate nursing care plans based on nursing diagnosis. CIN-Comp. inf. Nurs. 1987;5(4):140-145.	●						
Tannure MC. Construction and evaluation of the applicability of software with the nursing process in an adult intensive care unit. [Tese] Belo Horizonte: Federal University of Minas Gerais, Nursing School; 2012.						●	

Table 2 - List of studies on the production of software for nurses and their citations in databases consulted.
Legend: 1-SCOPUS; 2-WEB OF SCIENCE; 3-BIREME; 4-MEDLINE; 5-LILACS; 6-BDENF; 7-IBECS

Most of the 17 studies that comprised this review were conducted in Brazil (n = 12), and the United States (n = 6) and Spain (n = 1). The years analyzed, we found studies published since 1987, highlighting the year 2011, which totaled three scientific productions.

Of the 17 studies reviewed, 05 were published in journals classification A1 (29,3%); 04 were rated A2 published in journals (23,5%); 04 were published in journals rated B1 (23,6%); 01 was published in a journal of B2 rating (5,9%); 01 was published in a journal of B3 rating (5,9%); 02 studies were published in the media not included in the Qualis / CAPES classification (11,8%) - one in journal not rated and another in digital library of a university.

According to the impact strength and quality of the publication of the study, the journals were grouped where the studies analyzed were published, according to the Qualis classification established by CAPES as shown in Table 3.

Journal	QUALIS/CAPES	N	%
CIN - Computers Informatics Nursing	A1	3	17,6
Latin American Journal of Nursing	A1	2	11,7
ACTA Paulista of Nursing	A2	1	5,9
Journal of School of Nursing of the University of São Paulo	A2	2	11,7
Text & Context Nursing	A2	1	5,9
Put day urgency. emergency. Catastrophic	B1	1	5,9
Online Brazilian journal of nursing	B1	1	5,9
Oncology nursing forum	B1	1	5,9
Esc. Anna Nery Nursing Magazine	B1	1	5,9
Science, care and health	B2	1	5,9
Approach	B3	1	5,9
Permanent Journal	NC	1	5,9
Digital library of UFMG	NC	1	5,9
Total		17	100

Table 3. Classification of journals used in the study according to the Qualis criteria / CAPES.

Legend: N= number of studies by journal; NC= Journal not classified by CAPES

Also, a survey was conducted in the studies analyzed about the direction for implementation of these software developed by nurses, as described in Table 4. Most studies (n = 12; 71%) were carried out to develop software for use in the systematization of nursing care (SAE), and 10 (47%) directed to SAE general way, in any area of operation and 02 (12%) directed to SAE in specific areas. The other studies (n = 05; 29%) had a proposal for development of software for use in specialized areas and nursing procedures.

Software developed by nurses for use in assistance.	
Systematization of nursing care (general)	10
Systematization of nursing care in puerperium	1
Systematization of nursing care in post-anesthetic;	1
Classification of nursing care for assistance management	1
Classification of patients according to the level of dependency of nursing	1
Monitoring of occupational health nursing	1
Application to calculation of insulin IV	1
Classification of the quality of life of patients under radiotherapy	1

Table 4 - Direction for use of software developed by nurses, according to the studies reviewed.

According to the data collected in the articles analyzed an important trend to the classification of publications. Most of them occurred in journals belonging to Qualis/ CAPES A1 and A2, totaling 52%, which shows a refined quality and high impact strength, compared with only 12% that were published in journals not ranked by CAPES.

The period 1985-2003 was marked by publications directed to the importance of the use of NICTs in Nursing (n = 214), reflecting the need felt by nurses from the introduction of these new technologies in their day-to-day. The number of publications where nurses used free software adaptations for use in nursing care showed isolated actions and who turned to the replacement of some administrative, before prepared manually, for other electronic origin, seeking to streamline activities .

Regarding the production of software for nurses we can say that during this period the majority of publications turned to the education sector, reflecting the need to improve the quality of nursing education, a fact which produced a knowledge gap regarding the production of software focused on social assistance. There are 03 previous publications in 1990 and the other only the beginning in 2003, albeit with some fluctuations. Therefore, we noted that the operation of NTICs in nursing care is still very new and unexplored when compared to the amount of articles published by nurses on other topics.

A literature review conducted in 2011 in Brazil corroborates what we find when it analyzes the results published on the computerization of experience in nursing, points out that 43% of the experiments were directed to undergraduate teaching, while 20% were related to nursing administration, and only 17%, consisting of the development of the care the nursing process.⁸

Regarding the direction of appliance the software in the various sub-areas of nursing, there is a predominance of more than 70% for use in the Systematization of Nursing Assistance (SAE), each in a different institution, which makes us reflect on the difficulties in search/disclosure about the software - the final product of the study. The rest of the articles refer to making software for performing/aid to specific procedures, such as the development of a nursing documentation system prototype postpartum or the development of software in the area of occupational health.⁹

We must highlight the fact of the growing concern of nursing professionals with the use of technological resources that favors the expansion of care grounded in quality and

patient safety and information management related to it. Considering the information deficiency and dissemination of data on the care among health professionals, it is essential to standardize and identify the minimum set of data to be provided sufficient and necessary information for health care.¹⁰⁻¹²

As an illustrative effect of the great importance of using NTICs in nursing practice, Marin & Cunha published a study in 2006 that dealt with the current perspectives of nursing informatics and where already cited North American study to show that resort to the use of bases data as part of the care process allows for constant professional development which causes a positive assessment with regard to immediate access possibilities the necessary information and the improvement of patient care.

Facing the reality presented, it is considered that the information and software systems, together with the minimum data set and/or terminologies/classification systems are innovative, necessary and available resources, although still little explored and disseminated, can improve and strengthen the provided nursing care, as well as secure their patient safety linked to continue to be assisted.^{10,13-17}

CONCLUSION

Rapid advances in hardware and software with the development of computational literature favor their deployment in healthcare.

Among the advantages arising from the development of information technology, are the directly related to the reduction in the time taken for completion of documents, without diminishing the quality of data collected, which automatically should result in increased nursing time to stay together to the patient.

In this perspective, the growth and development of information technology and information systems have been providing various possibilities in healthcare, specifically in nursing. It is to improve health care, or to emphasize quality of care indicators, should enable these professionals so that they can with the proper knowledge to benefit from the use of these technologies and thus relocate your time optimized by technological innovation.

Importantly, the quality of care indicators, that with the introduction of information systems and software in nursing care daily, started to help organize and manage the increasing volume of information, providing real-time, whole and any data that nurses need to develop their actions and allows nurses electronically record the technical and scientific documents needed to emphasize ethically and legally before patients and society, besides forming databases for research.

Thus, it is for the computer science, demonstrate the financial and clinical advantages of the systems within the health care, and professionals, become aware of the benefits from this "New Age" for health, and know, really, use all new developments benefit of the patient.

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